

Vanadium catalysts and their precursors

Description of Technology: This invention generally relates to readily processible cluster compositions of vanadium and phosphorus which are precursors to vanadium-phosphorus catalysts including vanadyl pyrophosphate and vanadylbis (metaphosphate). The invention also relates to processes for making the cluster compositions, and processes for converting the precursors to vanadium-phosphate catalysts.

Patent Listing:

1. **US Patent No. 5,932,746**, Issued on August 3, 1999, "Vanadium catalysts and their precursors."

<http://patft.uspto.gov/netacgi/nph-Parser?Sect1=PTO2&Sect2=HITOFF&p=1&u=%2Fnetacgi%2FPTO%2Fsearch-bool.html&r=1&f=G&l=50&co1=AND&d=PTXT&s1=5,932,746.PN.&OS=PN/5,932,746&RS=PN/5,932,746>

Market Potential: Vanadyl pyrophosphate (VO)₂P₂O₇ (hereinafter generally referred to as "VPO") is the active catalyst used in several commercial processes which convert butane directly to maleic anhydride via air oxidation. The catalyst is believed to perform the selective oxidation of butane via utilization of its lattice oxygen from only the outermost surface layers of the VPO crystallites. Given the accumulated evidence of only surface layer involvement in this oxidation process, there have been numerous efforts to maximize surface area of the catalyst crystallites.

There are several other molecular organophosphorus-vanadium compounds in the open literature. However, none have a V:P ratio of 1:2. Therefore, in order to overcome some of the problems and deficiencies of the prior art, the present invention provides vanadium (IV) cluster compositions which are readily synthesized from simple reagents and which are single-molecule, highly processible precursors to vanadium-phosphorus catalyst materials. Deposition of the soluble precursors onto high surface area supports and spray drying of the soluble precursors with additional materials to produce novel catalyst composites are possible using these materials. Many of the results obtainable using the materials of the present invention are unavailable by other traditional routes to vanadium-phosphorus catalysts.

Benefits:

- Synthesized from simple reagents.
- Single-molecule, highly processible precursors to vanadium-phosphorus catalyst materials.
- Attrition resistant support.

Applications:

- Converting butane to maleic anhydride via air oxidation.

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